

Clean Version of Claim 1 Including Proposed Changes Thereto

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1. (Amended) Substrate for packaging of or for attachment to products which are sensitive to aging and temperature, having a time-temperature integrator arranged in the region of the substrate, wherein the time-temperature integrator contains a matrix and at least one reversible indicator embedded therein, which has photochromic properties on the basis of transfer reactions, and wherein further the reversible indicator is characterized by a time and temperature dependent discoloration following photo-induced coloration thereof.

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Clean Version of Claim 1 Including Proposed Changes Thereto

2. (Amended) Substrate according to claim 1, wherein the substrate is a packaging material.

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Clean Version of Claim 3 Including Proposed Changes Thereto

3. (Amended) Substrate according to claim 1, wherein the transfer reactions are based on the transfer of charged or uncharged hydrogen atoms or hydrogen isotopes.

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Clean Version of Claim 4 Including Proposed Changes Thereto

4. (Amended) Substrate according to claim 1, wherein the reversible indicator has a skeletal structure according to the general formula I;

(Formula page 2 of claims)

wherein A_1-A_5 = carbon atom and/or heteroatom

R_1-R_4 = hydrogen atom and/or isotope thereof, and/or Cl, F, Br, or a substituent selected from the group consisting of alkyl groups, methyl or aryl groups, and phenyl groups

R_5 = hydrogen atom or isotope thereof, or a substituent selected from the group consisting of Cl, F, Br, an alkyl group, a methyl group, an aryl group, phenyl group, and pyridine

R_6 = hydrogen atom or isotope thereof

B_1-B_7 = carbon atom and/or heteroatom

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R_1-R_{10} = hydrogen atom and/or an isotope thereof, and/or one or more Cl, F, Br, amino groups, nitro groups, or one or more substituents selected from the group consisting of alkyl groups, methyl or aryl groups, and phenyl groups,


R_{11} = nitro group or a cyano group or a carboxylic acid group or a variant selected from the group consisting of an ester, amide, ketone or aldehyde group.

Clean Version of Claim 5 Including Proposed Changes Thereto


5. (Amended) Substrate according to claim 1, wherein the reversible indicator has a skeletal structure according to the general formula II:

(Formula page 3 of claims)

wherein A_1-A_{12} = carbon atom and/or a heteroatom

 R_1-R_7 = hydrogen atom and/or isotope thereof, and/or Cl, F, B, or substituents selected from the group consisting of alkyl groups, methyl or aryl groups, and phenyl groups

R_8 = hydrogen atom or isotope thereof, or a substituent selected from the group consisting of Cl, F, Br, an alkyl group, phenyl group, and pyridine

 R_9 = H, D, T

B_1-B_7 = carbon atom and/or heteroatom

$R_{10}-R_{13}$ = hydrogen atom and/or isotope thereof, and/or one or more Cl, F, Br, amino groups, nitro groups, or one or more substituents selected from the group consisting of alkyl groups, methyl or aryl groups, and phenyl groups.

Clean Version of Claim 6 Including Proposed Changes Thereto

6. (Amended) Substrate according to claim 4, wherein in the general formula I, $R_4 =$

ml
sub
cut NO_2 and 2-4 NO_2 groups are present.

Clean Version of Claim 7 Including Proposed Changes Thereto

7. (Amended) Substrate according to claim 1, wherein the transfer reactions are based on large, charged or uncharged groups.

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Clean Version of Claim 8 Including Proposed Changes Thereto

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sub 27
8. (Amended) Substrate according to claim 1, wherein the transfer reactions are based on a charged or uncharged halogen atom.

Clean Version of Claim 9 Including Proposed Changes Thereto

9. (Amended) Substrate according to claim 1, wherein the reversible indicator has more than one characteristic time domain.

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Clean Version of Claim 10 Including Proposed Changes Thereto

10. (Amended) Substrate according to claim 1, wherein at least two reversible indicators having different characteristic time domains are embedded in the matrix.

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Clean Version of Claim 12 Including Proposed Changes Thereto

12. (Amended) Substrate according to claim 1, wherein at least one irreversible indicator having photochromic properties is arranged in the region of the reversible indicator.

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Clean Version of Claim 13 Including Proposed Changes Thereto

13. (Amended) Substrate according to claim 1, wherein the time-temperature integrator has a filter which is impermeable to light which effects photo-induced coloration of the reversible indicator.

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Clean Version of Claim 14 Including Proposed Changes Thereto

14. (Amended) Substrate according to claim 13, wherein the filter is impermeable to light in the wavelength range of below approximately 430 nm.

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Clean Version of Claim 15 Including Proposed Changes Thereto

15. (Amended) Substrate according to claim 1, wherein the substrate includes a reference scale arranged in the region of the time-temperature integrator.

Clean Version of Claim 16 Including Proposed Changes Thereto

16. (Amended) Substrate according to claim 1, wherein the matrix is a polymer film.

Clean Version of Claim 17 Including Proposed Changes Thereto

17. (Amended) Substrate according to claim 1, wherein the substrate is a polymer

film.

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Clean Version of Claim 18 Including Proposed Changes Thereto

18. (Amended) Substrate according to claim 1, wherein a substrate region forms the matrix for the reversible indicator.

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Clean Version of Claim 19 Including Proposed Changes Thereto

19. (Amended) Process for determination of quality of products which are sensitive to aging and temperature comprising the steps of :

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- a) providing a substrate for packaging of or for attachment to a product which is sensitive to aging and temperature, having a time-temperature integrator arranged in the region of the substrate, wherein the time-temperature integrator contains a matrix and at least one reversible indicator embedded therein, the at least one reversible indicator having photochromic properties on the basis of transfer reactions, and wherein further the reversible indicator is characterized by a time and temperature dependent discoloration following photo-induced coloration thereof;
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- b) effecting photo-induced coloration of the reversible indicator; and
- c) determining the degree of time-related and temperature-related discoloration and the quality of the product taking into account the degree of discoloration.

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20. (Amended) Process according to claim 19, wherein the determination of the quality of the product is effected by evaluating the degree of discoloration with the aid of a reference scale.

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Clean Version of Claim 21 Including Proposed Changes Thereto

21. (Amended) Process according to claim 19, further comprising the step of providing an irreversible indicator having photochromic properties, the irreversible indicator arranged in the region of the reversible indicator, and wherein further the irreversible indicator is applied after photo-induced coloration of the reversible indicator.

Clean Version of Claim 22 Including Proposed Changes Thereto

22. (Amended) Process according to claim 19, further comprising the step of providing the time-temperature integrator with a filter that is impermeable to light which effects photo-induced coloration of the reversible indicator, and wherein further the filter is applied after photo-induced coloration.

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Clean Version of Claim 23 Including Proposed Changes Thereto

23. (Amended) Process according to claim 19, wherein the photo-induced coloration of the reversible indicator is effected by UV or near UV light.

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Clean Version of Claim 24 Including Proposed Changes Thereto

24. (Amended) Process according to claim 19, wherein the photo activation of the time-temperature integrator is effected by irradiation of the side of the time-temperature integrator opposite the filter.